CLIMATE CHANGE IMPACTS ON FISHERIES

OSCAR C. TABADA
Visayas PAGASA Regional Services Division

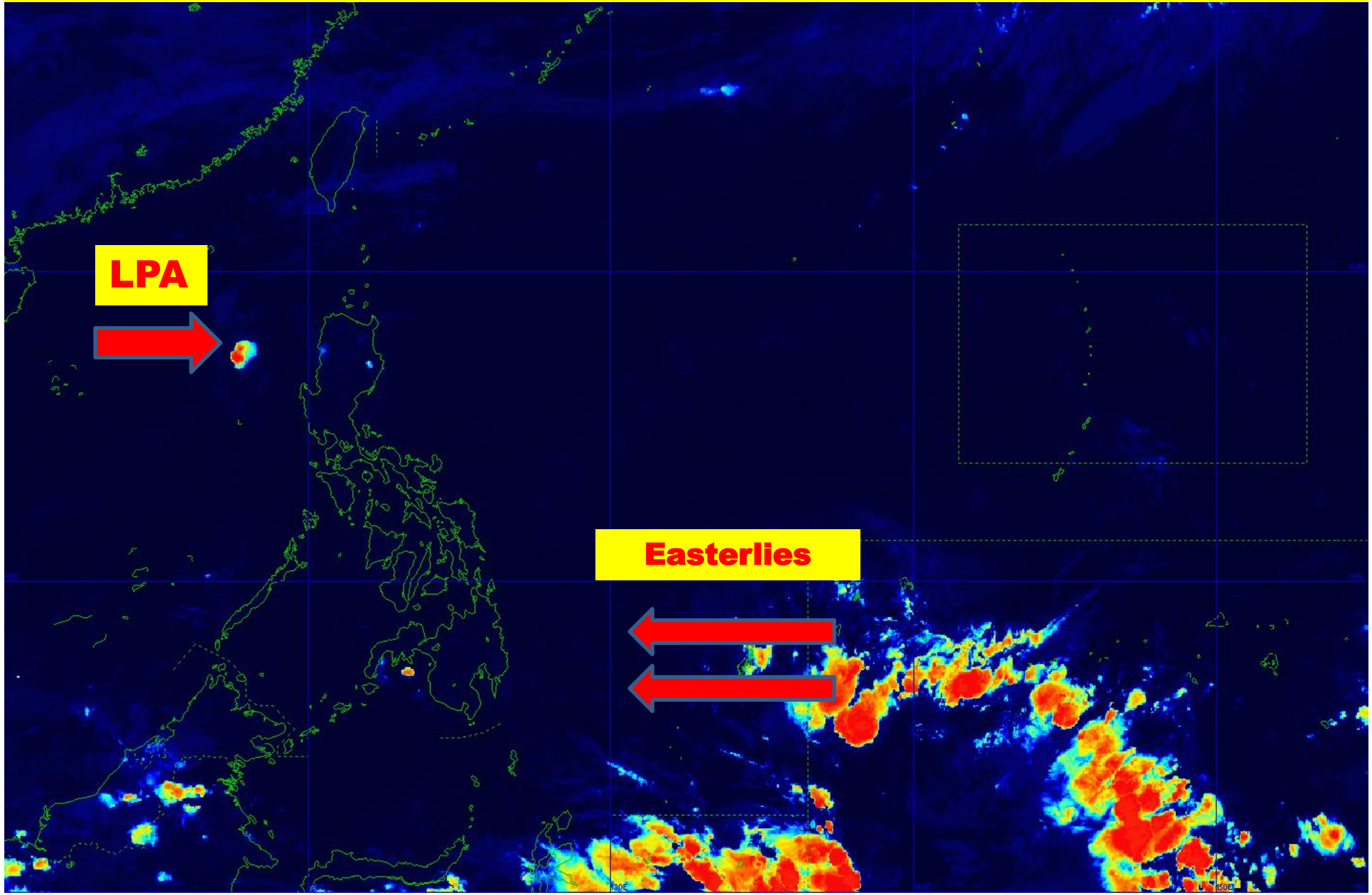
MODEL ANALYSES AND FORECAST

PAGASA VISAYAS

19 April 2017

tracking the sky…helping the country”

At 4:00 AM today, the Low Pressure Area (LPA) was estimated based on all available data at 275 km West Northwest of Dagupan City, Pangasinan (17.1°N, 118.0°E). Ridge of a High Pressure Area (HPA) extending across Luzon and Visayas. Easterlies affecting the eastern section of Mindanao.



Why the frequent floods, and how to prevent them?

Why does it flood so easily these days?

THE QUESTION: IS THEIR REALLY A CLIMATE CHANGE? IF THERE IS, WHO CARES?


Carmen-Danao, Cebu Floodings (April 15, 2017)
Due to LPA (formerly TD CRISING)
돼지갈비
Hiring

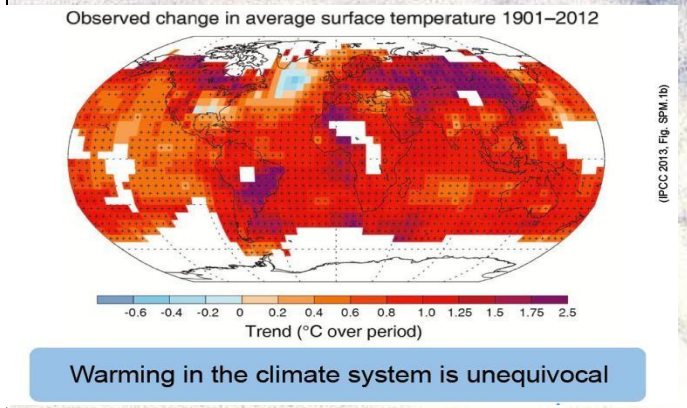

Mega
PIZZA

Dec. 13, 2013: SNOW In Egypt for the First Time In 112 Years

Jan. 28, 2016: **Nobody panic, but it's snowing in Saudi!**

- Global warming refers to the gradual increase of the Earth's temperature because of energy trapped by the Earth's atmosphere
  - The retention of the heat by the atmosphere is called the greenhouse effect.

CLIMATE CHANGE IS UPON US



Warming in the climate system is unequivocal

HAVE TO ACKNOWLEDGE THAT CLIMATE CHANGE IS HAPPENING, IS ACCELERATING, AND

THE EARTH WILL

WARM EVEN

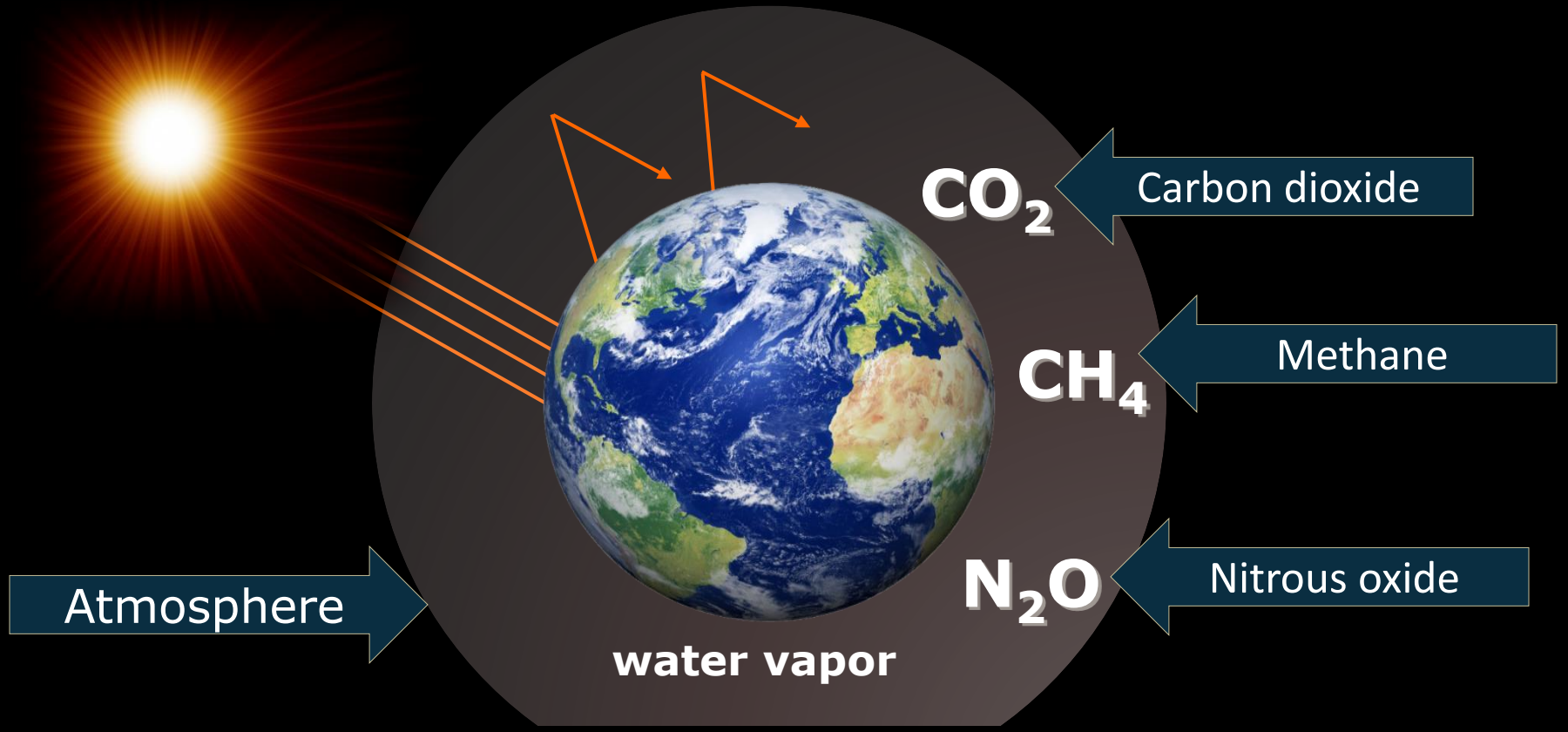
MORE

2-6° C

IN NEXT 100 YEARS

Greenhouse Gases

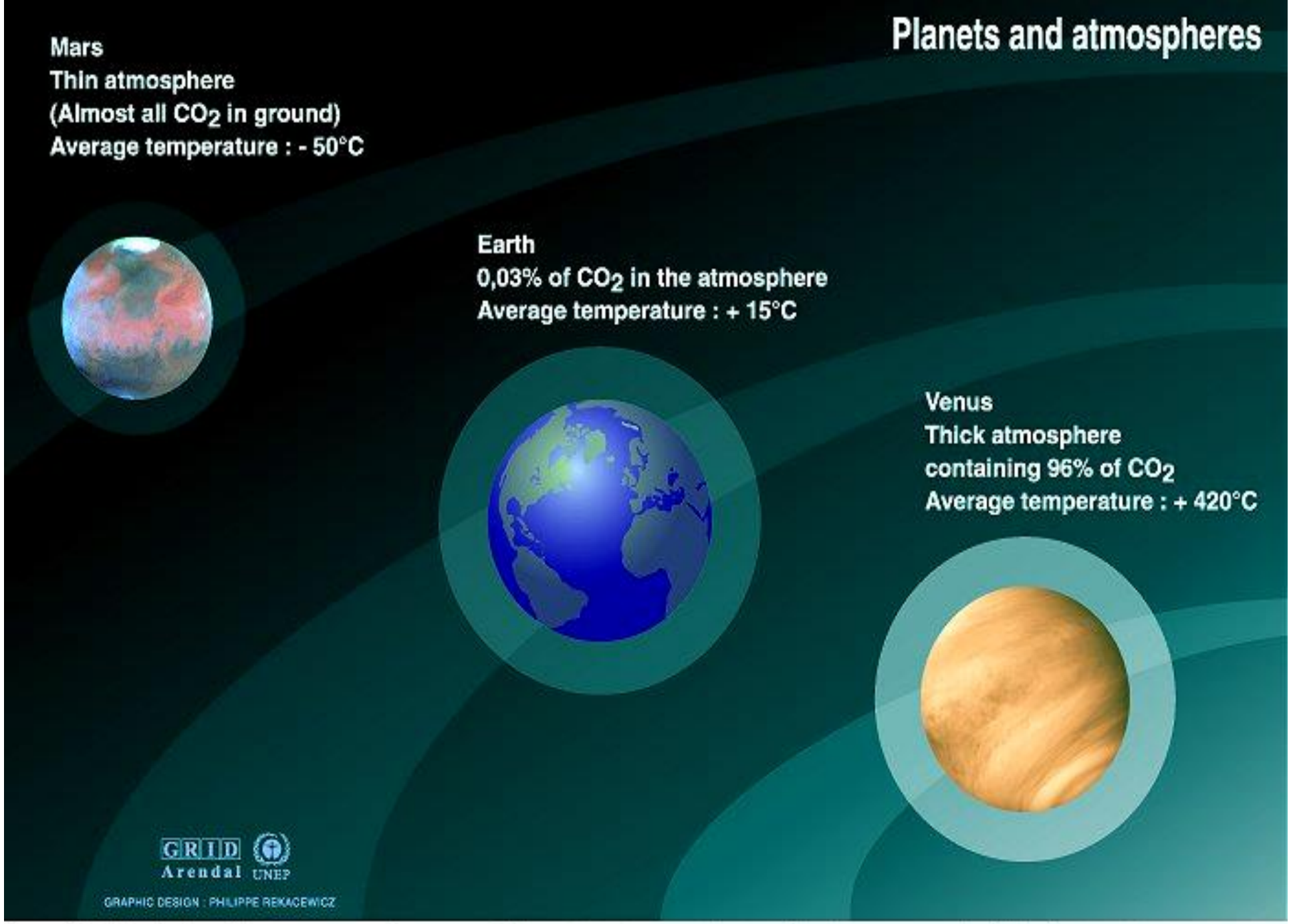
"Greenhouse Effect"



Without greenhouse gases, the Earth's surface is -15°C warmer than it otherwise would be. Without this natural greenhouse or blanket effect, life as we know it would not be possible.

@cro/is2010@

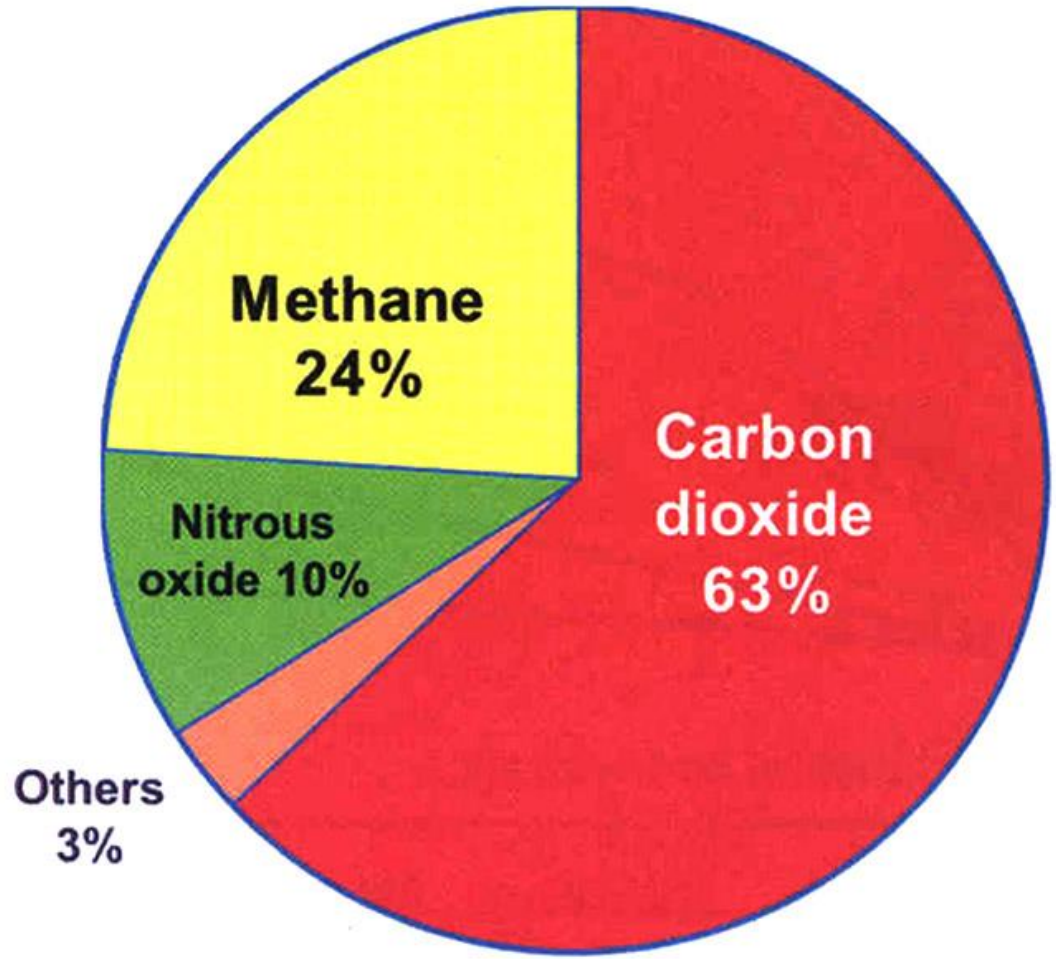
Planets and atmospheres



Sources: Calvin J. Hamilton, Views of the solar system, www.planetscapes.com; Bill Arnett , The nine planets, a multimedia tour of the solar system, www.seds.org/billa/tnp/nineplanets.html

CO_2 is the major contributor to global warming

Current emissions, effect over next 100 years



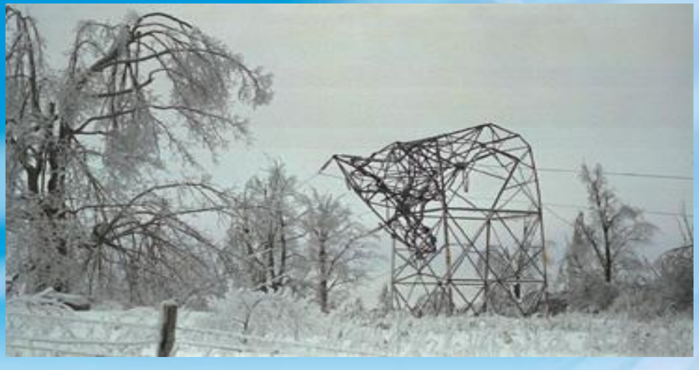
- warmer

What's wrong with warmer temperatures?

Climate Change

different places in different ways

will effect



More intense and longer droughts since 1970

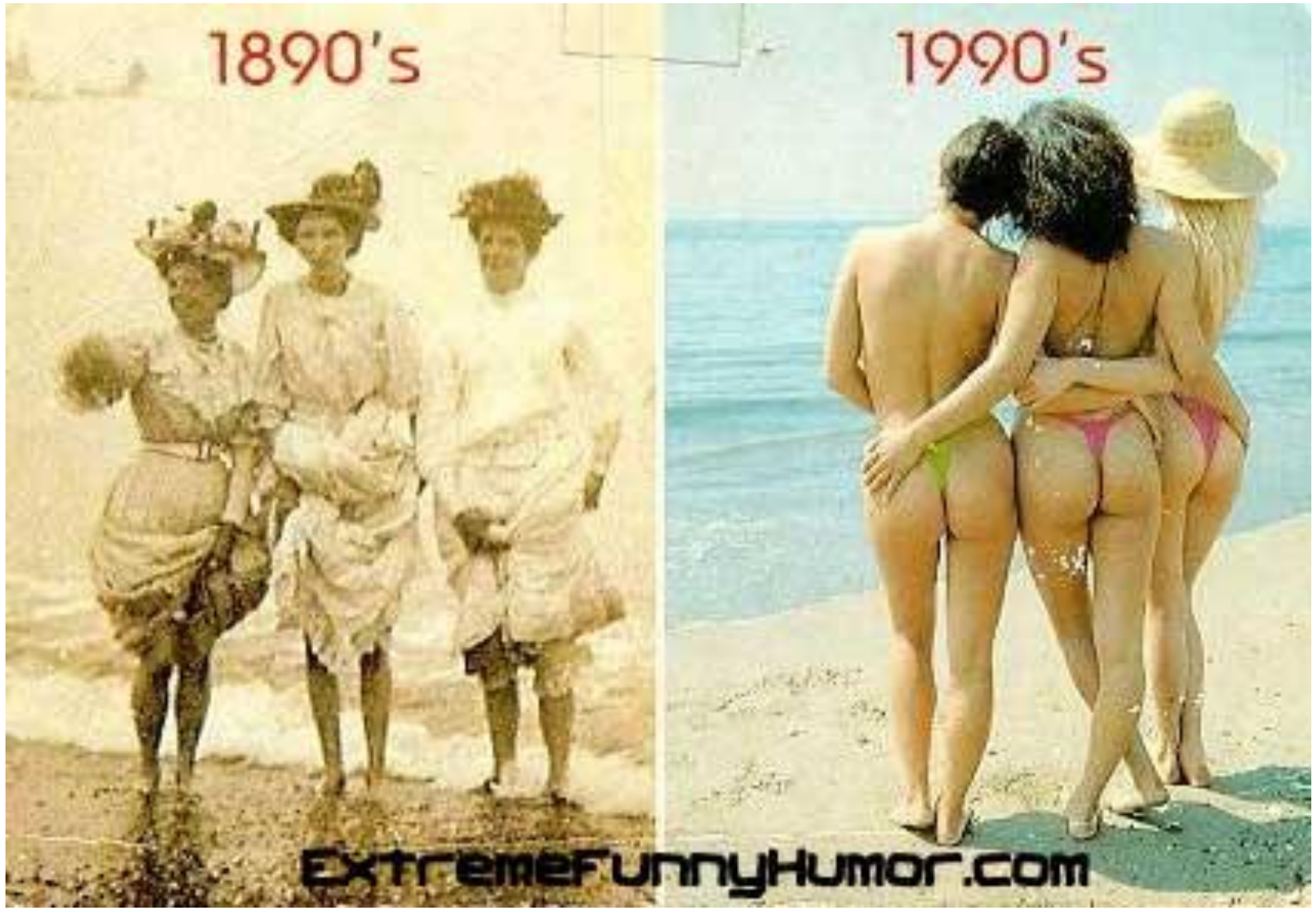
Increase intensity of tropical cyclone activity since 1970.

Direct Observations of Recent Climate Change

Hot days, hot nights, & heat waves have become more frequent.

Source: IPCC 4th Assessment Report:

ITS GETTING WARMER



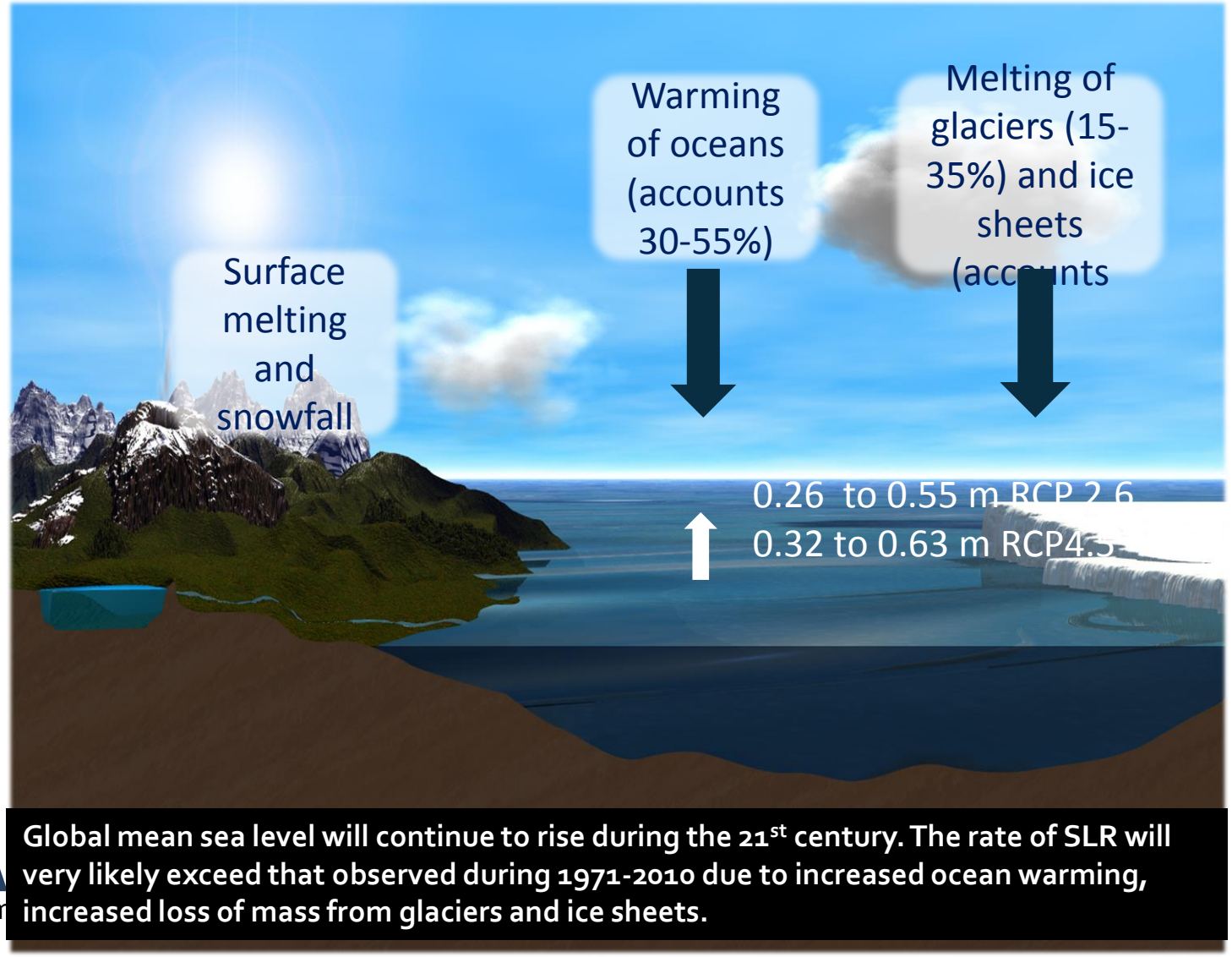

FACEBOOK

When Will We Feel Climate Change?

With the ice caps melting, more water is poured into the oceans, thus raising their levels. The seas invade low-lying areas. If the melting of the ice does not stop, low-lying islands will disappear; the bigger ones will have their areas reduced as the seas invade their shores.

FUTURE IMPACTS OF CLIMATE CHANGE

Sea Level Rise Projections (2081-2100)



Global mean sea level will continue to rise during the 21st century. The rate of SLR will very likely exceed that observed during 1971-2010 due to increased ocean warming, increased loss of mass from glaciers and ice sheets.

Pedersen Glacier (1920's – 1940's)

When photographed here sometime between the 1920s and the 1940s, Pedersen Glacier was calving icebergs into the lake from a seracs-capped terminus that ranged from about 66 to 131 feet high. No vegetation is visible. (Kenai Fjords National Park)

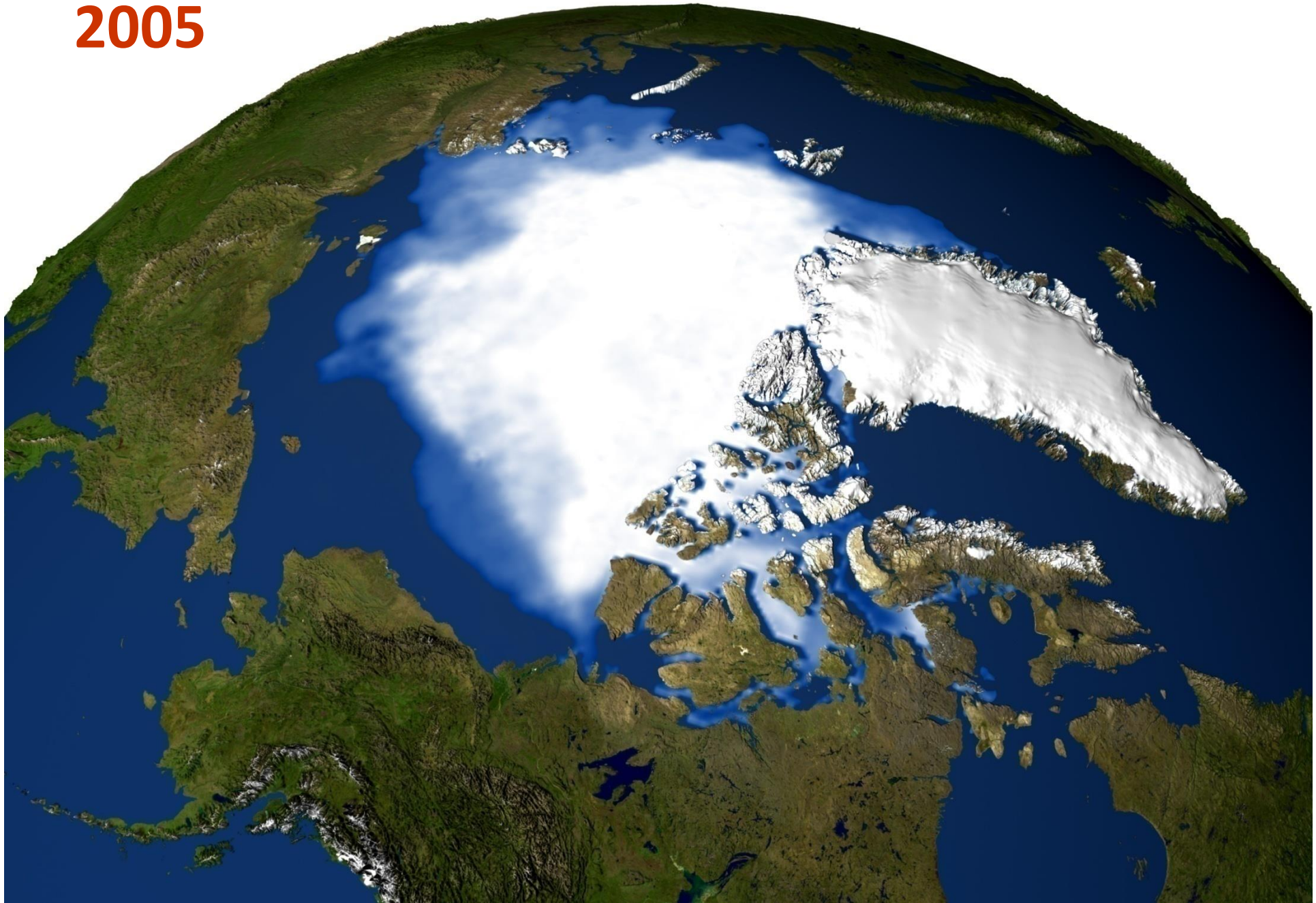
Pedersen Glacier 2005

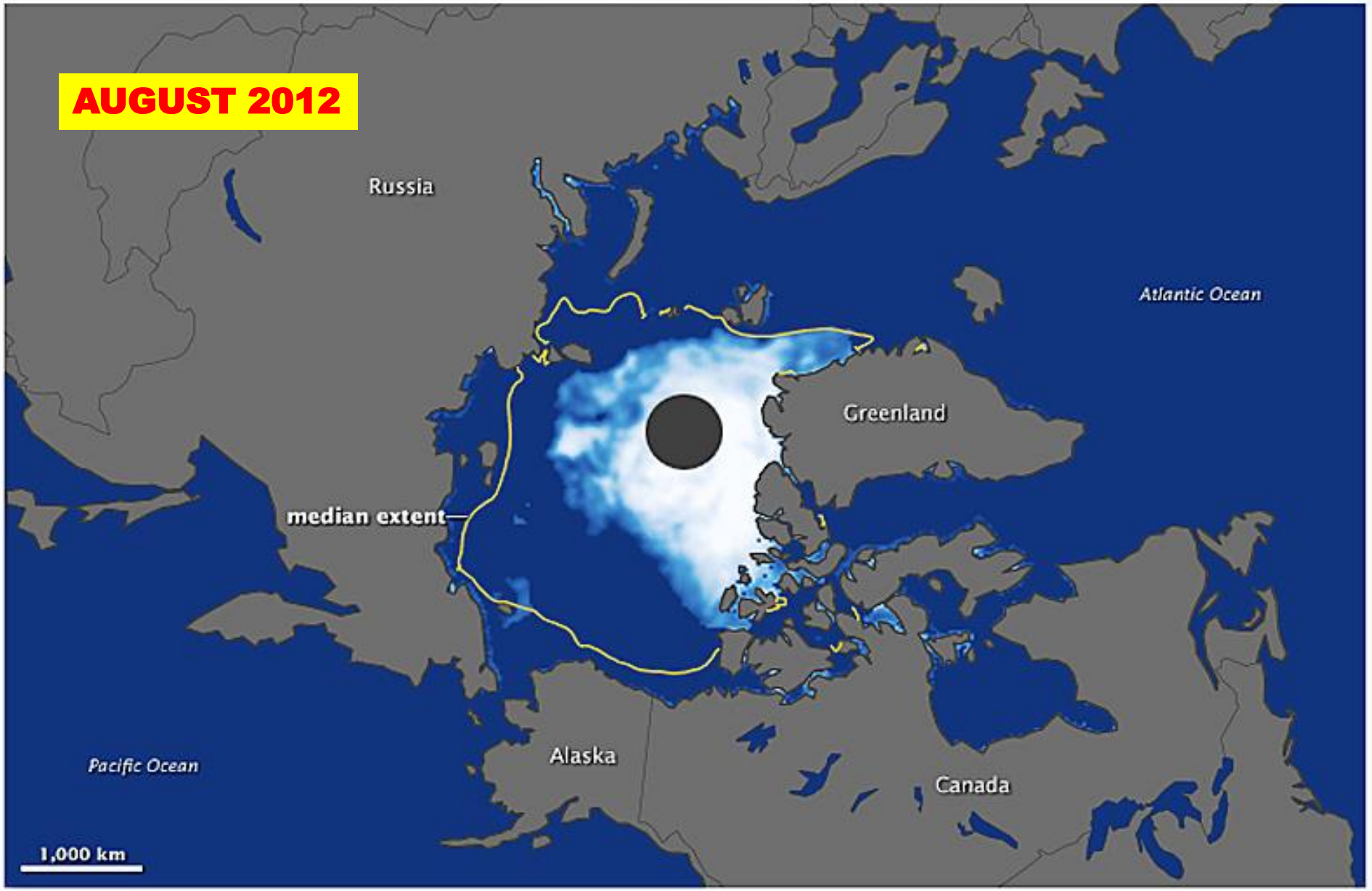
The second photo dates was taken Aug. 10, 2005. Since the first photo, most of the lake has filed with sediment and now supports grasses, shrubs and aquatic plants. The glacier's terminus has retreated by more than a mile and no icebergs are visible. Isolated patches of snow are present at a few higher elevation locations. (USGS/Bruce Molnia)

Now.


NORTH
POLE
Since 1979, more than
20% of the Polar Ice Cap
has melted away.
ARCTIC SEA
ICE BOUNDARY IN 1979
PHOTO: NASA ©2003 NRDC

2005

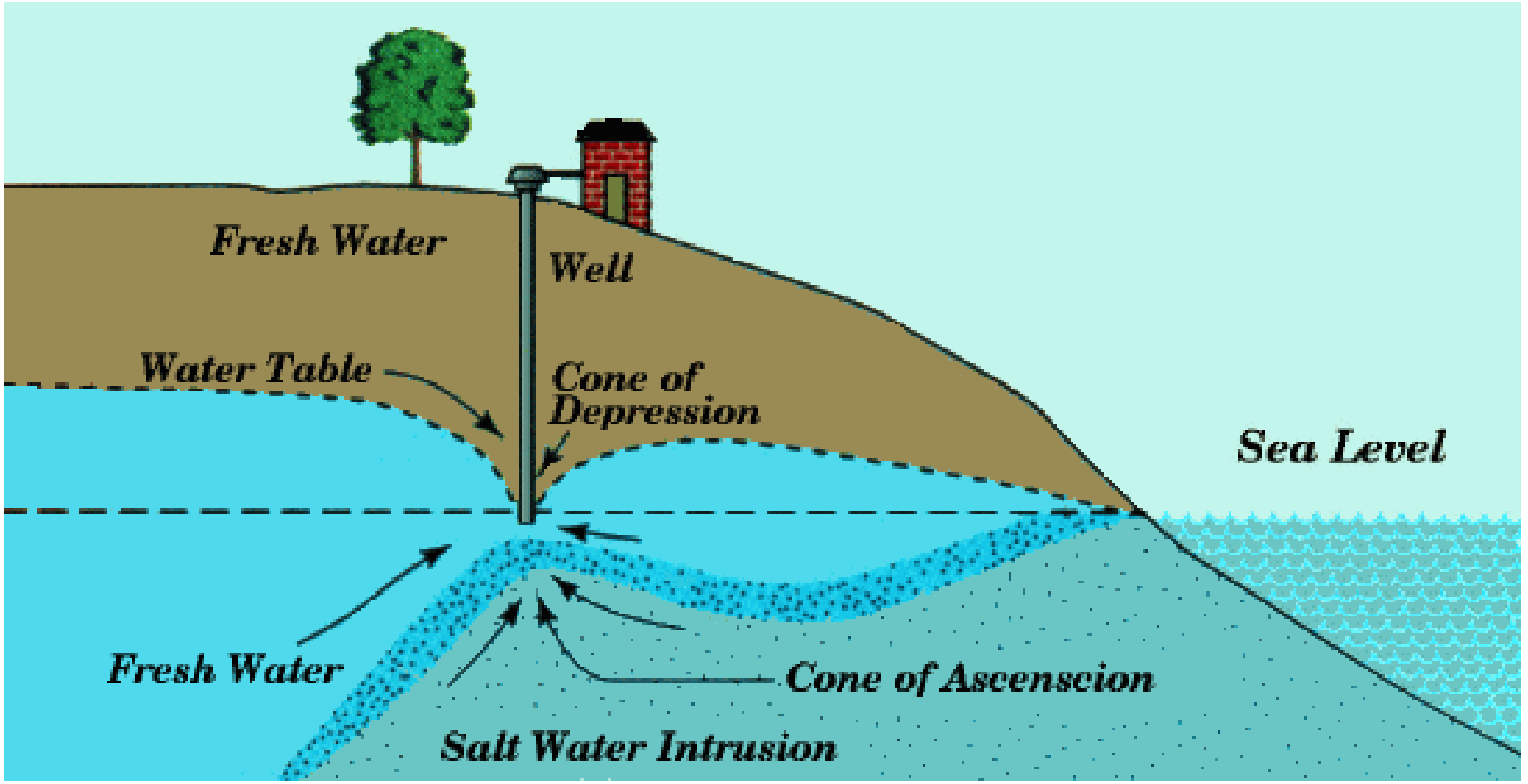



AUGUST 2012
Russia
Atlantic Ocean
Greenland
median extent
Pacific Ocean
Alaska
Canada
1,000 km
Sea Ice Concentration (percent)
0
50
100

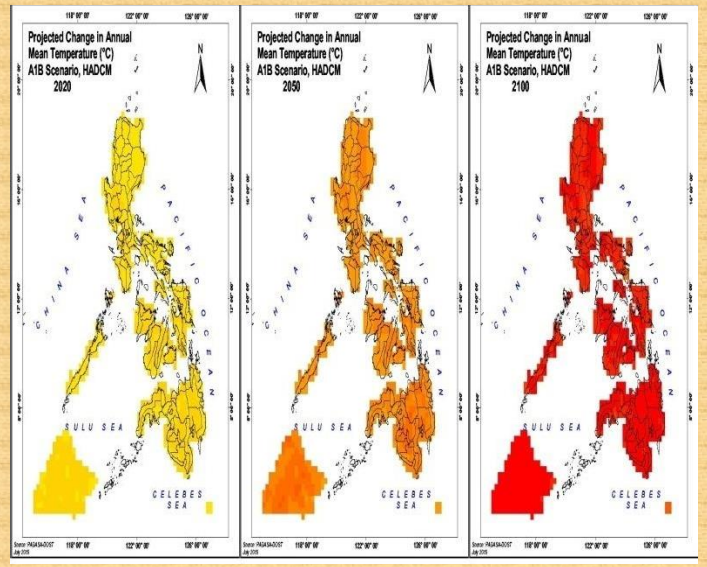
Rising sea levels


Seas aren’t just rising, scientist say- its worse than that.
They’re speeding up of 3-5mm per year.

Saltwater intrusion



Increased average summer temperature



0.9 to 1.1ºC | 1.9 to 2.2ºC | 2.6 to 3.4ºC

2020
0.9 to 1.1 ºC
2050
1.9 to 2.2 ºC
2100
2.6 to 3.4 ºC

- Increased Heat stress
- Increased incidence of vector-borne diseases
- Risks to biodiversity
- Heat related deaths
- Risk to Food Security

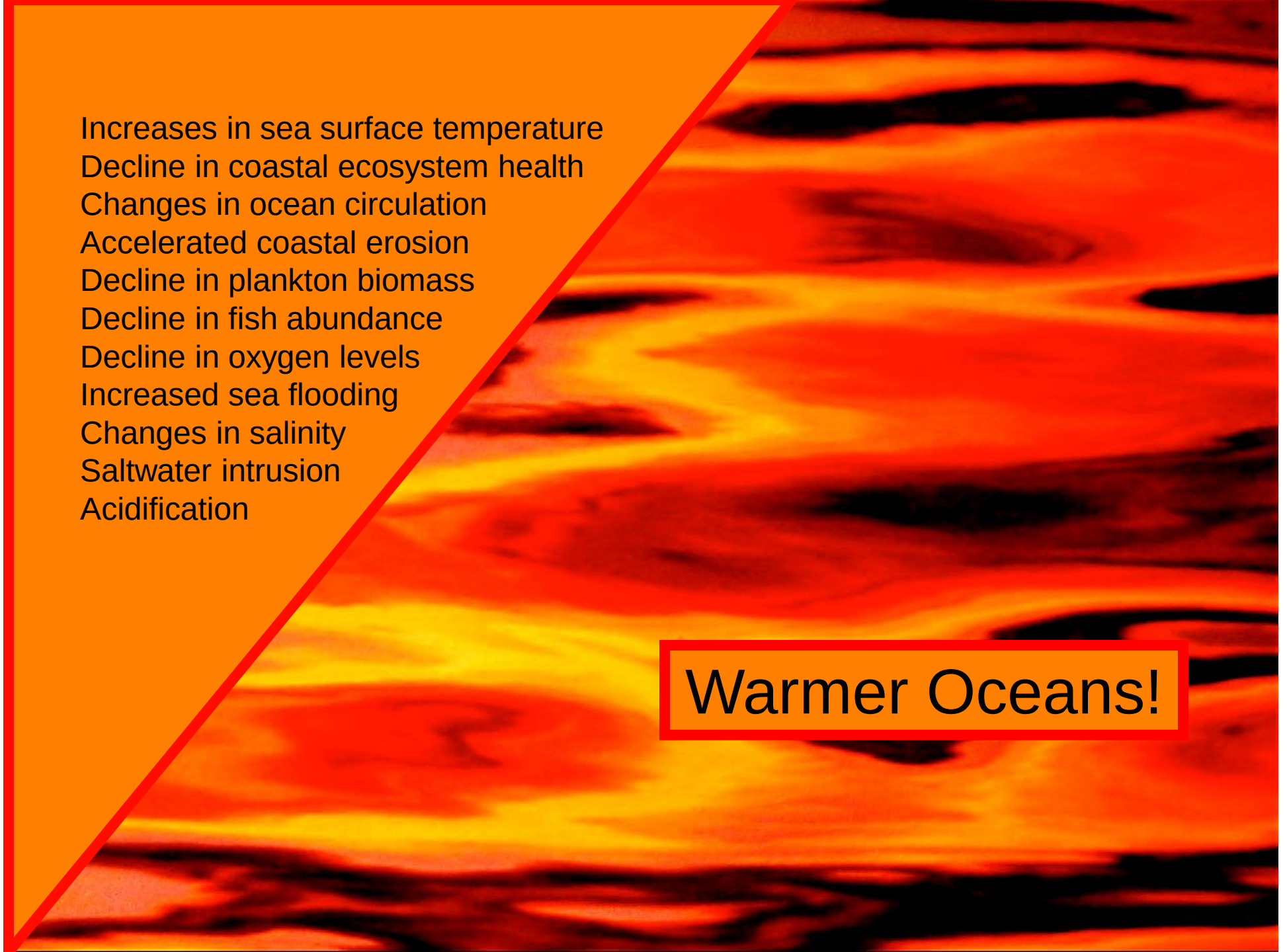
Projected Temperature Increase for the Philippines
Medium emissions

The starting point

for WWF's analysis was
the strong scientific consensus that
any human-induced warming
greater than two degrees Celsius
above pre-industrial levels
would have a dangerous
and highly damaging impact
on both human societies
and their economies
and the global environment
as a whole.

2°

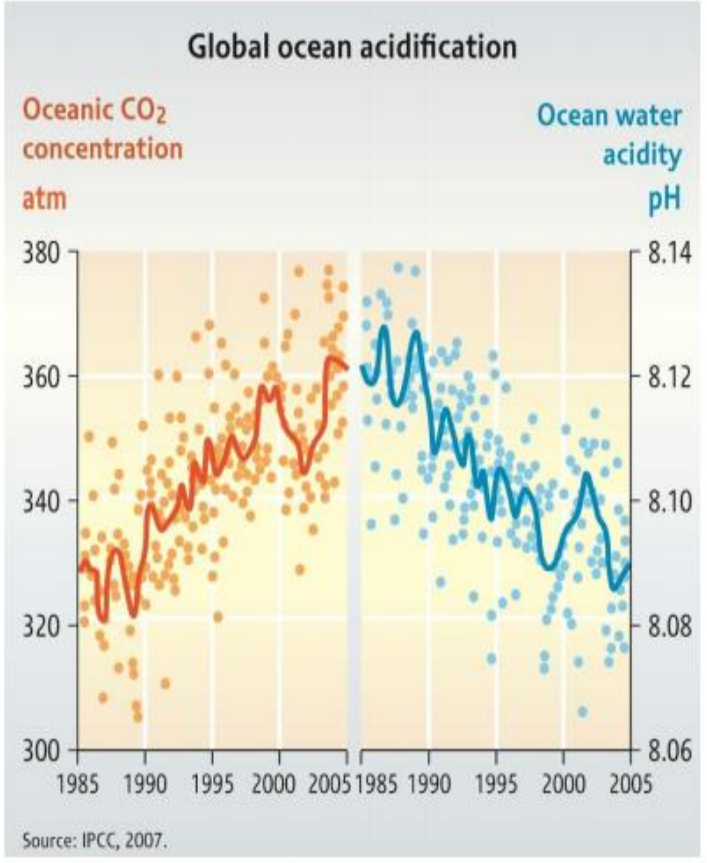
Celsius


Increases in sea surface temperature
Decline in coastal ecosystem health
Changes in ocean circulation
Accelerated coastal erosion
Decline in plankton biomass
Decline in fish abundance
Decline in oxygen levels
Increased sea flooding
Changes in salinity
Saltwater intrusion
Acidification
Warmer Oceans!

CLIMATE CHANGE IMPACTS ON FISHERIES

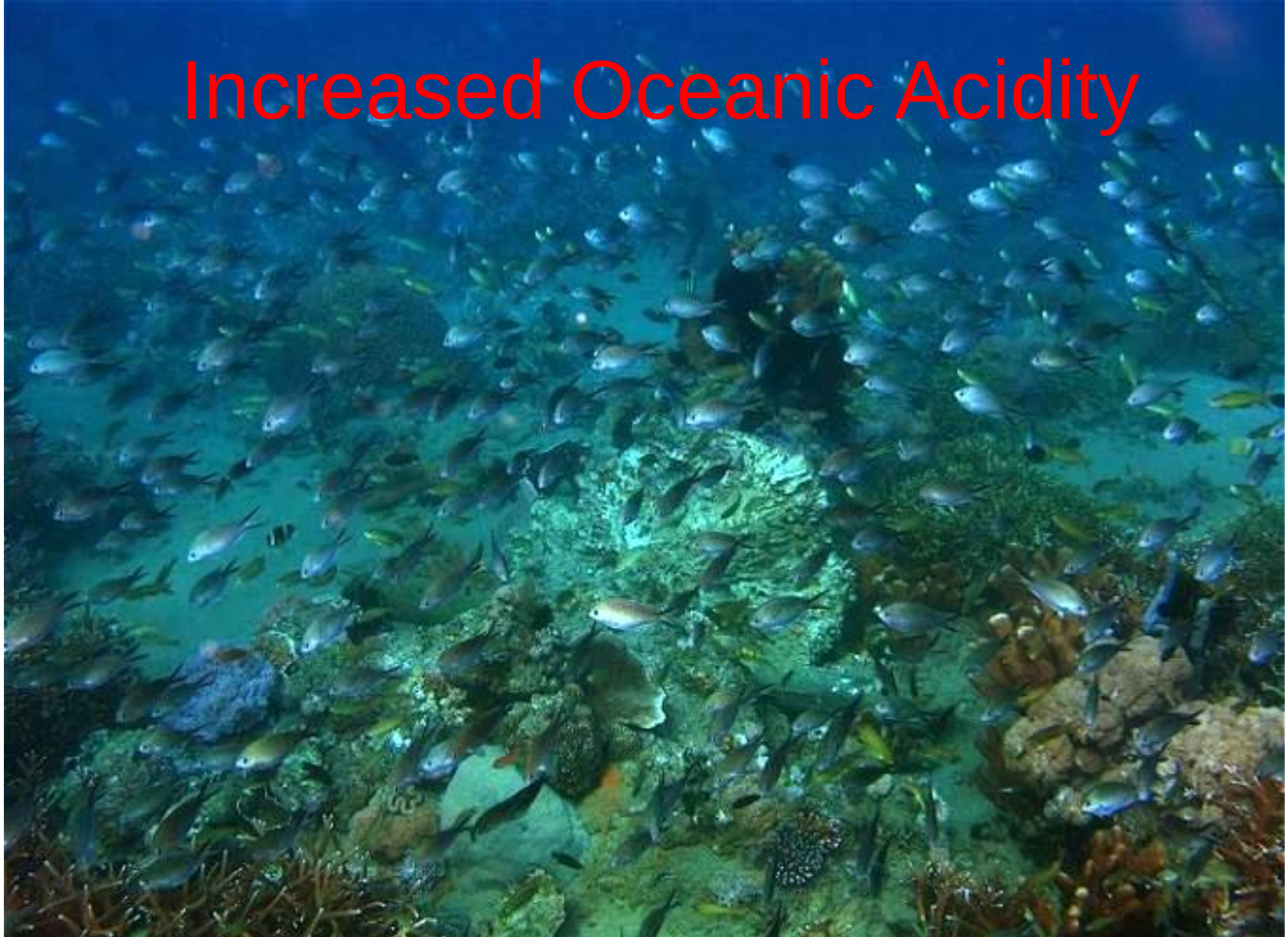
Ocean Acidification/ Decrease in ocean pH

- CO_2 uptake has decreased ocean pH
  - Implications on biology of organisms (reproduction, growth, neural functions, etc.) and ecosystem processes (reef building, primary productivity, etc.)



Source: IPCC 4th Assessment Report: Climate Change 2007| Hoegh-Guldberg et al (2014).

Increased Oceanic Acidity



Extinction of Species

(c) WWF-Canon / Martin HARVEY

- Philippine waters are within the path of migrating populations of whale sharks and manta rays
  - At least 22 species of Marine Mammals

3000 Species of Fish in the Philippines Alone

We can't afford to lose these treasures in our Islands.

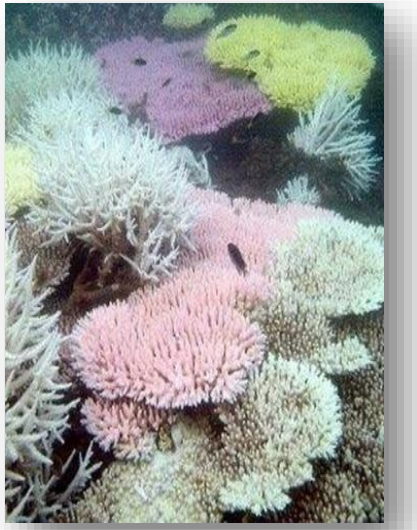
CLIMATE CHANGE IMPACTS ON FISHERIES

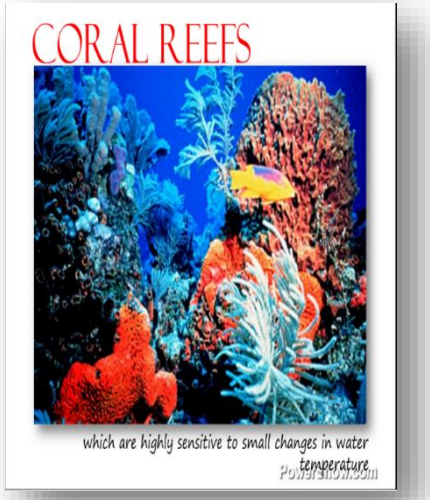
Type of change	Climatic variable	Impacts	Potential Impacts to Fisheries
Fish stocks	High SST	Change in physiology and sex ratios of fished species Altered timing of spawning, migrations, and/or peak abundance Increased invasive species, diseases and algal blooms	Changes in timing and levels of productivity across marine and freshwater systems Reduced production of target species

Source: Allison,EH et al. (2009). Vulnerability of national economies to the impacts of climate change on fisheries. Fish and Fisheries DOI: 10.1111/j.1467-2979.2008.00310.x

CLIMATE CHANGE IMPACTS ON FISHERIES

- Dramatic change in distribution and quantities of fish and sea foods.
- Coral bleaching on massive scales never seen before due to warming of sea water.
- Decreased calcification in corals, mollusks and other shell-forming organisms (softening of shells).
- Trigger algal blooms that cause red tides as well as fish kills.





CORAL BLEACHING

Net positive growth may no longer be possible.

Mass Fish Death

TEMPERATURE INCREASE BY 2-6 DEGREES

DECLINE OF 29% / 60% IN PHIL AGRI PRODUCTION

WILL DIRECTLY THREATEN FOOD SECURITY, ESPECIALLY SINCE THE PHILIPPINES HAS ONE OF THE HIGHEST POPULATION GROWTH


Intense heat waves. More wildfires and
forest fires. Damages to the ecosystem.

Decline of Forest Cover

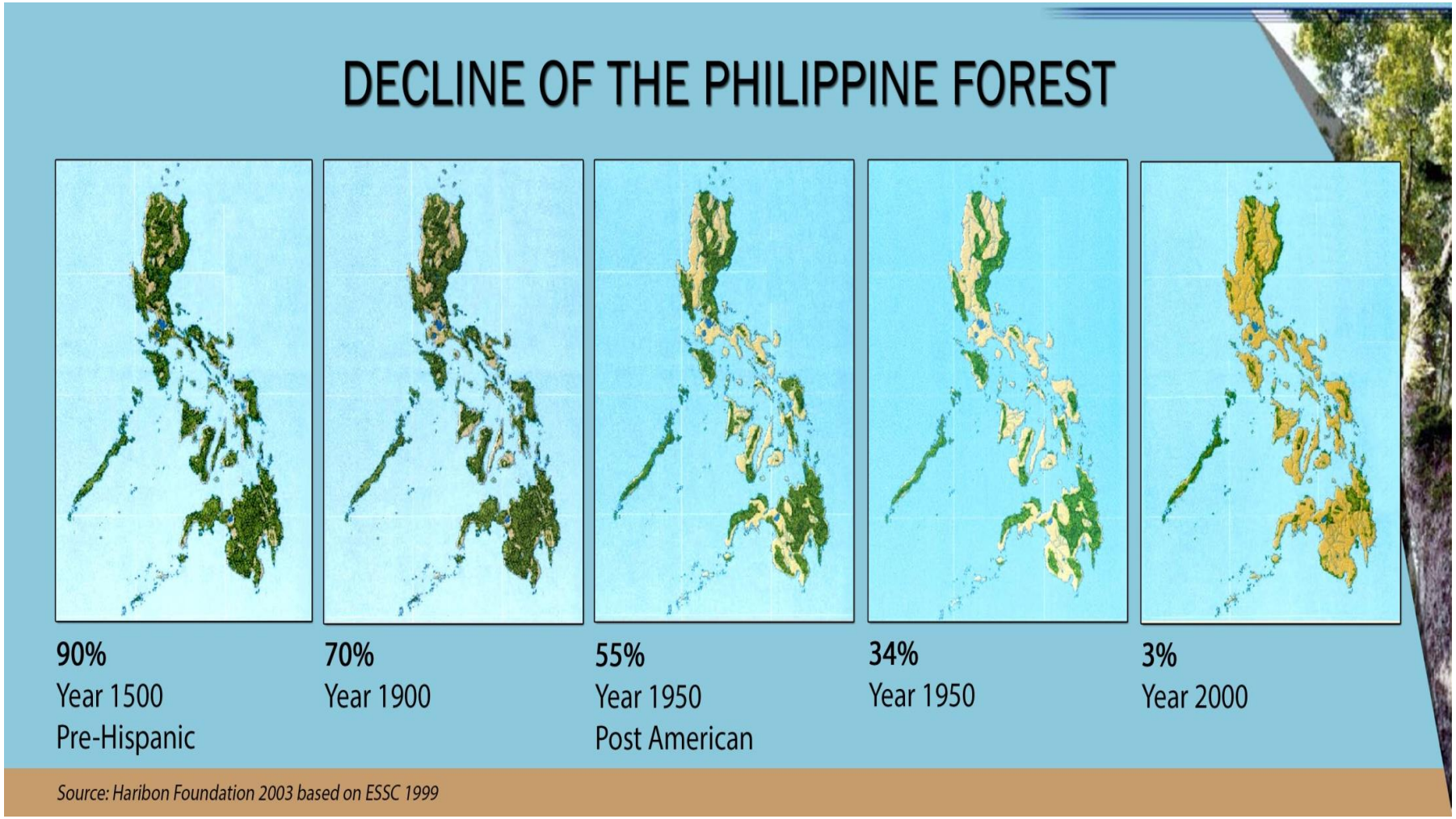
Illegal logging, Greedy loggers have ravaged our forests and most of our mountains are now bald. Without trees, there are no roots to hold the soil together. Thus, rainwater easily erodes the mountainsides, carrying the topsoil down to the streams and rivers below.

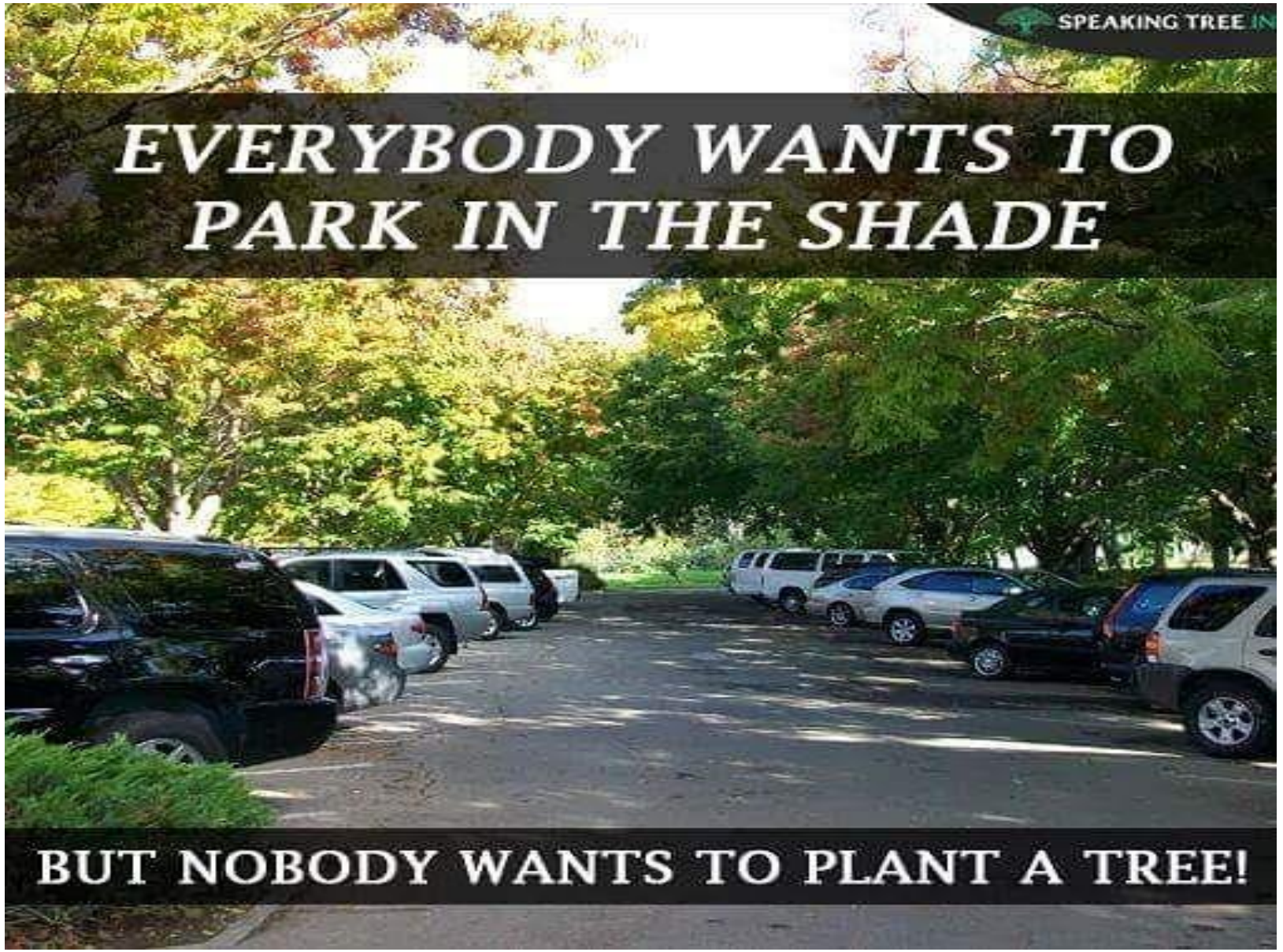
As the water flows down the waterways, it drops the silt it is carrying. Over the years, this silt has made the waterways shallower so that they can hold less and less water. They therefore easily overflow their banks.

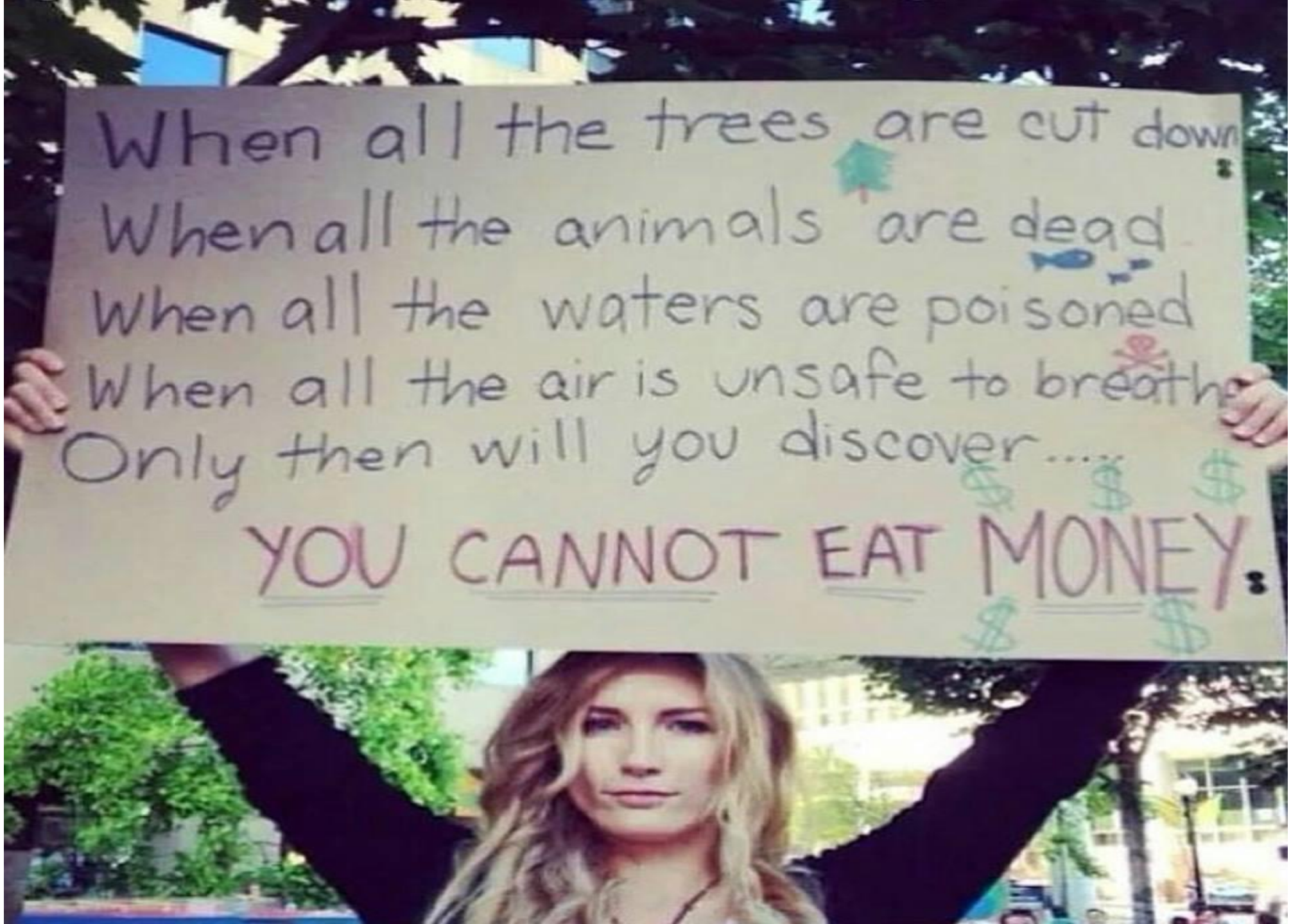
Floodwaters are now brown, unlike before when they were clearer and cleaner. That is because of the silt they are carrying. When the floods recede, they leave a thick layer of mud. That is also the mud that they deposit at the bottom of the waterways.

Environment

1. Reforestation , Reforestation, Reforestation




SPEAKING TREE
EVERYBODY WANTS TO
PARK IN THE SHADE
BUT NOBODY WANTS TO PLANT A TREE!


When all the trees are cut down
When all the animals are dead
When all the waters are poisoned
When all the air is unsafe to breathe
Only then will you discover.....
YOU CANNOT EAT MONEY.

Rapid Urbanization With the development of more housing subdivisions on what were once rice fields, the construction of more office buildings, shopping malls and residential condominiums in the cities.

Inadequate drainage system. The planners did not anticipate the big volumes of water that would inundate the land. The drainage system, therefore, cannot drain the rain and floodwaters fast enough.

The fifth factor is GARBAGE specifically the bad habit of many Filipinos to throw their trash anywhere, and especially into waterways.


Call 689-9111
Wilkins
Wilkins

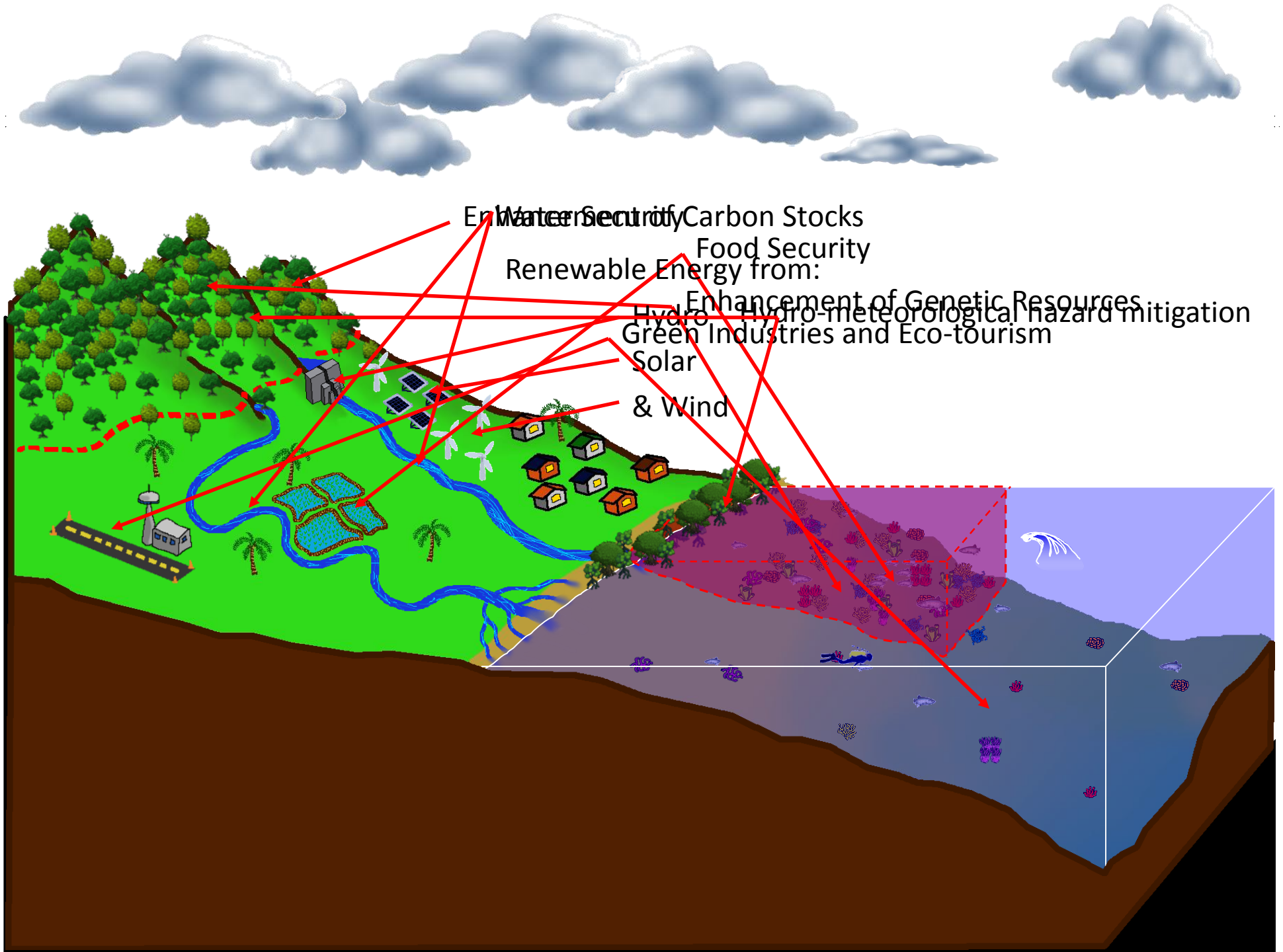
Discipline

These are Humans.

These are Animals.


"Climate change
is a problem
with a solution"
Source: Ontario Climate Change Discussion Paper 2015, p 3, emphasis added

MITIGATION


Enhancement of Carbon Stocks
Water Security
Food Security
Renewable Energy from:
Enhancement of Genetic Resources
Hydro
Hydro-meteorological hazard mitigation
Green Industries and Eco-tourism
Solar
& Wind

P. S.

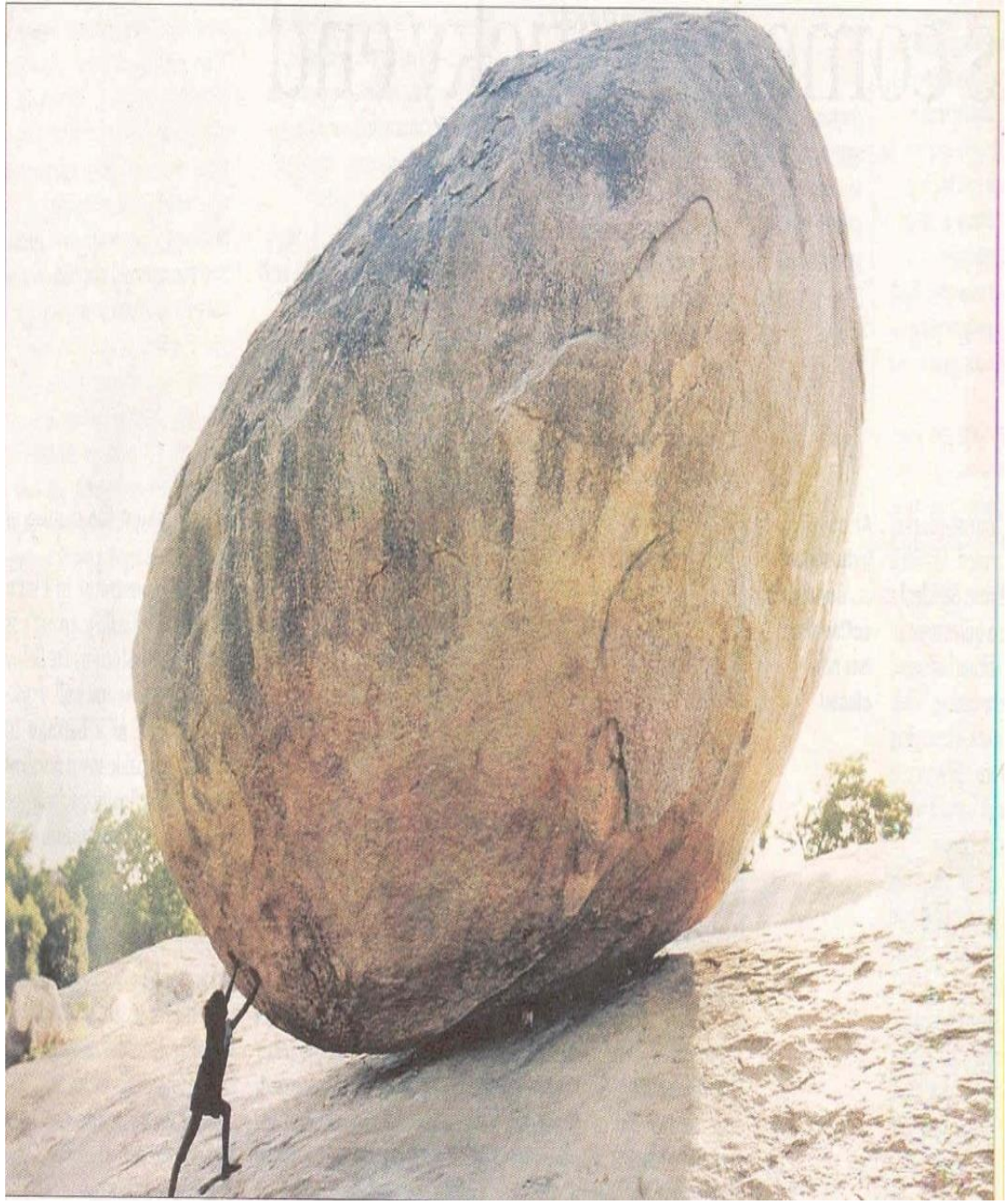
things to remember…

Building Resilience always involves taking some risks….

Resilience reduces the burden placed on governments

Resilience requires Creative Innovation

Resilience requires Creative Innovation



Building Resilience can feel a bit like this….

but when the task is shared it is realisable


KASALANAN NINYO ITO!
QUARRYING
GOV'T
HOUSING PROJECTS
EROSION
GARBAGE
DEFORESTATION


STOP CLIMATE CHANGE
BEFORE IT CHANGES YOU.


Is This Really the Kind
of Future We Want?

"In the end, we will conserve only what we love, we will love only what we understand, and we will understand only what we are taught."

— Baba Dioum, Senegalese conservationist

WWF

for a living planet®


LET US PRAY
FOR US
PRAY FOR
PHILIPPINES

ACT NOW !!!

Plant/Grow more Trees !!

THANK YOU!